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NEW OR PROBLEMATIC *ANOLIS* FROM COLOMBIA. VI. TWO FUSCOAURATOID ANOLES FROM THE PACIFIC LOWLANDS, *A. MACULIVENTRIS* BOULENGER, 1898 AND *A. MEDEMI*, A NEW SPECIES FROM GORGONA ISLAND

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Abstract. *Anolis maculiventris* Boulenger, 1898, the widespread Pacific lowland *fuscoauratus* group anole of northwestern South America, is redescribed on the basis of a series of specimens from the region of the type locality in northern Ecuador. A second fuscoauratoid species, *Anolis medemi*, new species, is described from Gorgona Island, 56 km west of the Pacific Coast in Colombia.

INTRODUCTION

Anolis fuscoauratus-like lizards are widespread and often common at many sites in the Andean cordilleras and along the Pacific lowlands of northwestern South America. Williams (1976) recognized and briefly defined a fuscoauratoid complex as part of his key to the species groups of South American anoles. Nevertheless, accurate identification of individual specimens has often proved difficult: scale counts are very similar, distinctive colors fade soon after death, and only short descriptions of the type specimens of each species have been available for reference.

Williams (1976) listed five species in the fuscoauratoid group: *A. antonii* Boulenger, 1908, *A. fuscoauratus* Dorbigny, in Dumeril and Bibron, 1837, *A. maculiventris* Boulenger, 1898, *A. ortoni*

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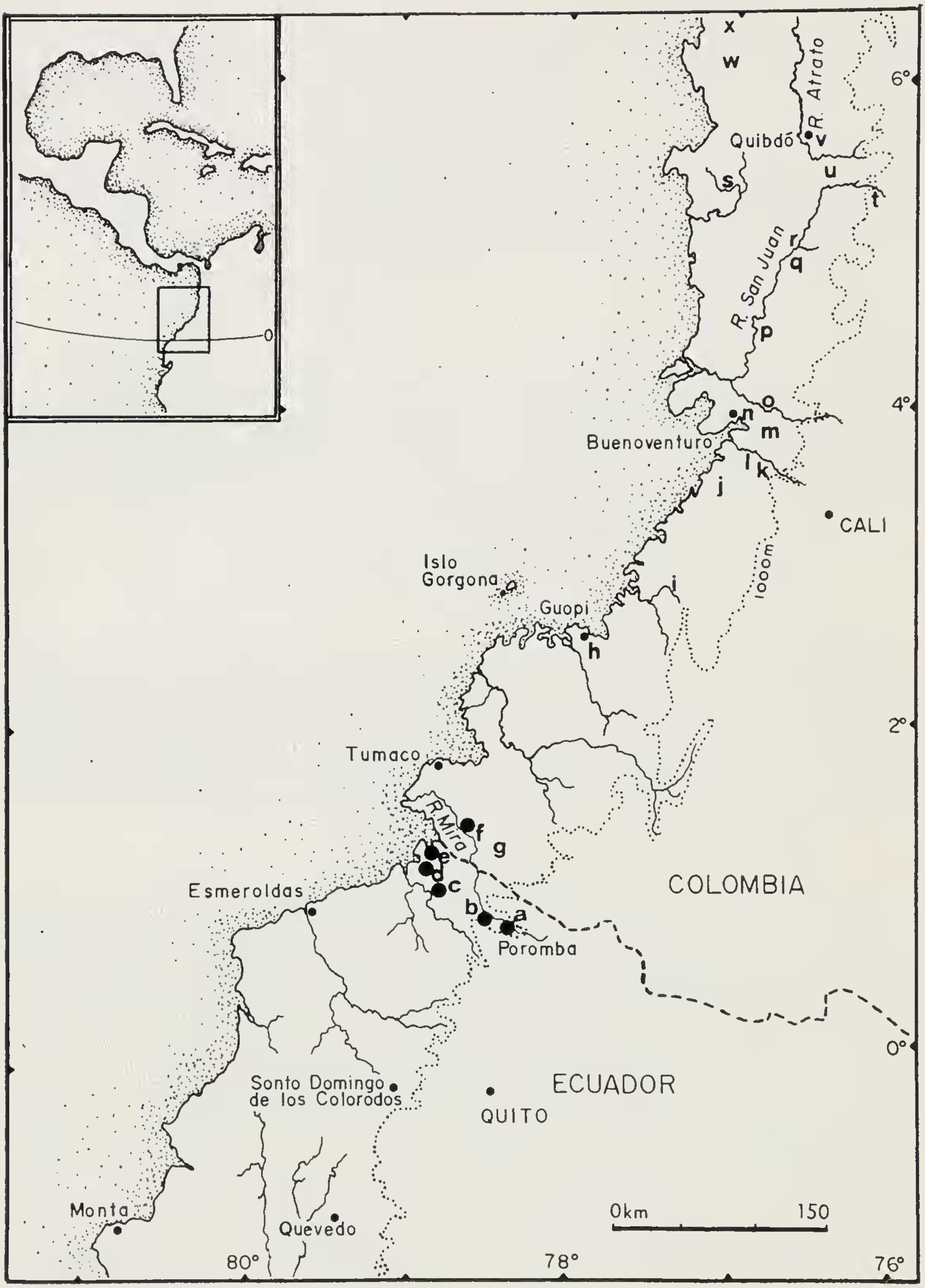

Figure 1. *Anolis maculiventris* collection sites, and location of museum specimens: a–f, in the region of the type locality (a), specimens used for this description; g–x, other Colombian sites providing specimens assigned to this species. a—Hacienda Paramba, Imbabura (BMNH; NHMB, NHMW, ZMB); b—Lita, Imbabura (KU, NHMW); c—Cachabí, Esmeraldas (USNM), and Río Cachabí near

Cope, 1868, and *A. trachyderma* Cope, 1875. Two additional taxa, *A. tolimensis* Werner, 1916 and *A. mariarum* Barbour, 1932, were treated as synonyms of *A. antonii* but are now known to be valid species. *A. ortoni* has subsequently been considered a member of the *pentaprion* rather than the *fuscoauratus* species group because of its large, flat head scales and the low dorsal crest on its tail.

Fuscoauratoids are part of the beta section of the genus, with transverse processes on the tail vertebrae. Adults are small to medium size, reaching 50–60 mm snout–vent length. Their dorsal scales are small, uniform and usually keeled; belly scales are usually smooth, or sometimes bear a low keel; head scales are small and most often wrinkled or keeled, with those of the frontal depression sometimes much smaller than the others; the tail is round and slender, with no dorsal crest; toe lamellae are broad and well defined, totaling fewer than 20 on phalanges ii and iii of the longest hind toe.

An eventual definitive review of this group will require multivariate analysis, personal familiarity with each species' distinctive color patterns and behavior under natural conditions, and electrophoretic studies as well. Meanwhile, detailed knowledge of the characteristics and variation of the populations at each type locality (the topotypic populations) is essential for reliable identifications and comparison with lizards from other areas. We begin

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Río Basalito (USNM); d—Estación Forestal "La Chiquita," 14.4 km S. of Lan Lorenzo, Esmeraldas (MCZ); e—San Lorenzo, Esmeraldas (USNM); f—Tangareal, Nariño (ICN, MCZ, BMNH); g—La Guyacana, Nariño (FMNH); h—Guapi, Cauca (UVC); i—Quebrada Guanguí, Río Patia, upper Río Saija drainage, Cauca (AMNH); j—Río Raposo, Valle (UMMZ); k—Anchicayá, Valle, and various sites in the vicinity (ICN, IND-R); l—Llano Bajo, Valle, and Sabaletas (ICN); m—Hacienda Los Mangos, Río Dagua, Valle (BMNH); n—Buenaventura, Valle (BMNH, UMMZ); o—Granja Forestal Experimental, bajo Río Calima, Valle (BMNH, ICN, CSJ, KU); p—Quebrada Docordó, between Cucurrupí and Noanamá, Chocó (AMNH); q—Peña Lisa, Condoto, Chocó (BMNH, MCZ, ICN); r—Andagoya, Chocó (BMNH, USNM, ICN); s—Río Dubasa, Chocó (MCZ); t—Pueblo Rico, "Caldas," now Risaralda (BMNH); u—area between Río San Juan and Río Atrato (LACM); v—Quibdó, Chocó (CSJ, ICN); w—Alto del Buey, Chocó (LACM); x—Serranía del Baudo, Chocó (LACM). A list of the museums mentioned is in the acknowledgments.

here a series providing more useful descriptions, comparisons of the named tax within the *fuscoauratus* group, and descriptions of some new species found during our work. Redescriptions of named species are based mainly on specimens recently collected at or near the type localities. Montane fuscoauratoids are discussed in a following report.

The map (Fig. 1) includes an additional 16 Colombian localities for *A. maculiventris,* including six localities (93 specimens) visited by Ayala's group, and 10 based on specimens in various museums. The term "large adult" refers to our estimate of modal large adult size, based on snout–vent length (SVL) measurements. It may exclude the occasional very large individual and does not take into account sexual size differences mentioned in the text. Most measurements used were made at the time of preservation (e.g., all specimens collected by one of us (SCA) or Ayala's collaborators in Colombia), but some were taken after different times in preservative. Ayala has seldom found more than a 2-mm shrinkage following preservation for anoles that measured 50–55 mm in life.

Anolis maculiventris Boulenger, 1898

Syntypes. BMNH 1946.8.13.33, an adult male (SVL 45 mm), BMNH 1946.8.13.34, an adult female (SVL 50 mm), Hacienda Paramba, Imbabura, Ecuador (0°49′N, 78°21′W), W. F. H. Rosenberg and assistants coll.

This is a small brown lizard, the only fuscoauratoid yet described from the western lowlands of Ecuador and central and southern Colombia (Fig. 1). Its type locality was cited as Hacienda Paramba, a farm in the Mira River valley between Ipiales and San Lorenzo in northern Ecuador. Río Mira briefly forms part of the Colombia-Ecuador border not far below the farm. The two *maculiventris* syntypes were donated to the British Museum by W. F. H. Rosenberg, who together with various assistants collected extensively up and down the valley between 1896–1899. Rosenberg was a collector-dealer, who frequently had some of his specimens first determined and described by Boulenger, and then sold the remainder of his series to other museums. Rosenberg's *maculiventris* must have come from the lower elevation, wet forested regions downstream (0°50–53′N, 78°20–30′W), possibly in the Province of Imbabura (south bank of the Río Mira at Paramba), or Carchi (north bank of the river at Paramba), or perhaps even in Esmeraldas (20 km below the farmhouse). Upstream, the valley becomes an arid, almost treeless desert (tropical and premontane thorn woodland, in the Holdridge classification), unsuitable for forest lizards like *A. maculiventris.*

The following description is based on our study of the two British Museum syntypes, plus 13 additional *maculiventris* from nearby sites in Imbabura, Esmeraldas and Nariño (Figs. 1a–f). COLOMBIA. *Nariño.* Tangareal, along the Río Mira: MCZ 159587–89, 160216. ECUADOR. *Esmeraldas.* Immediate vicinity of Cachabi: USNM 234723; Río Cachabí near Río Basalito: USNM 234724; San Lorenzo: USNM 234725; Estación Forestal "La Chiquita," 14.4 km S. San Lorenzo: MCZ 160248. *Imbabura.* Lita, 520 m: KU 133437, NHMW 12809; Paramba: BMNH 1946.8.13.33–34 (syntypes), NHMB 5060, NHMW 12810–11, ZMB 16462 (the latter four specimens are probably Rosenberg material seen by Boulenger). Scale counts for the male and female syntypes, respectively, are given in parentheses.

Description. Head. Head scales moderate to small, smooth, tuberculate or weakly keeled. Ten to 14 (m: 11, f: 14) across snout between second canthals. Frontal depression distinct, the scales within it posteriorly minute and tubercular, anteriorly slightly larger, smooth and flat. Six to nine (m: 8, f: 9) postrostrals, including the two anterior nasals. Anterior nasal in contact with the sulcus between rostral and first supralabial, rarely divided horizontally.

Supraorbital semicircles well defined, separated by three or four (m: 3, f: 4) small scales, separated by circumorbitals from the scales of the supraocular disk. Supraocular disk rather well defined, 5–10 enlarged scales, usually 1–3 much larger than the others, smooth or weakly keeled, grading laterally, anteriorly and posteriorly into granules. One elongate superciliary covers about one-third of the superciliary border, followed by one or two much shorter scales and then by granules. Canthal ridge distinct, canthals about nine, first 4–5 larger, the anteriormost in contact with the first supralabial or separated by one scale. Six to nine (m: 8, f: 8) loreal rows, the one or two lowest largest. Temporals and supratemporals granular. No distinct intertemporal zone or line of enlarged scales. Supratemporals grading into slightly larger scales lateral and anterior to the interparietal. Interparietal with well defined parietal eye, smaller, much smaller than or subequal to ear. Surrounding scales smooth, flat, pavement-like, much smaller than interparietal. Four to nine (m: 7, f: 9) scales between interparietal and semicircles. Scales behind interparietal tiny rounded granules, not or hardly differentiated from nape granules.

Subocular in contact with supralabials. Six to nine (m: 8, f: 7–8) supralabials to below the center of eye.

Mental almost completely divided, in contact with seven to ten (m: 9, f: 8) scales between the infralabials. No differentiated sublabials.

Trunk. Dorsal scales subgranular, smooth or weakly keeled, subequal or two median rows very slightly enlarged. Ventrals larger than dorsals, smooth, flat or slightly swollen, separated, juxtaposed or subimbricate. Chest scales in female smooth (poorly visible in male because of dewlap).

Dewlap. Extending well beyond insertion of forelimbs in males, absent in females. Lateral scales in rows separated by naked skin. Edge scales smooth, no larger than lateral scales.

Limbs. Limb scales unicarinate anteriorly, granular behind. Supradigitals multicarinate. Twelve to 16 (m: 15, f: 16) scales under phalanges ii and iii of fourth toe.

Tail. Round or slightly compressed, never with a crest, about 2× snout–vent length. Enlarged postanals almost always absent, but visible in occasional males.

Measurements. Five males in this series measure 43–46 mm SVL (m: 43, Boulenger gave 45); six females measure 44–49 mm (f: 49, Boulenger gave 50). Based on our series of nearly 100 Colombian *maculiventris* >40 mm SVL, most large adults measure 45–48 mm, with exceptional specimens reaching 50 mm, and with no apparent sexual difference. Tail almost twice snout–vent length.

Color. Information on the color in life is available for only one of these specimens, KU 133437, a male from Lita, Imbabura—S. R. Edwards: "By night, sleeping on a leaf. Dorsum light brown. Dewlap orange peripherally, red medially. Venter tan. Tail barred, tan and grayish brown." Other specimens assigned to this species from sites farther south include MCZ 160249, a male from Tinalandia, Pichincha, 16 km from Santo Domingo de los Colorados on the road to Quito—K. Miyata:

> Collected at night. Color light brown with hint of olive. Dark brown markings. Can change quickly to dark mahogany brown with almost black look. Dark brown line between eyes over top of head. Venter pale dirty brown, yellowish around cloaca. Dewlap bicolored, dull orange around edge, dirty brick red along throat. Scales on dewlap yellow anteriorly, dirty white posteriorly. Iris brown.

KU 133709, a female from 4 km N. of Quevedo, Los Rios—T. H. Fritts:

> At base of elephant ear plant at edge of stream by day. Dorsum olive brown with few black flecks; venter gray-beige invaded laterally by olive brown flecks of lateral body.

And a composite description drawn from several dozen specimens from the region to the north around Buenaventura, Valle:

> A brown or gray-brown lizard, most often patternless or sometimes with diagonal series of small yellow spots on the sides, or occasionally in males with vague dark shadows or bands between the pale rows of spots. When frightened it can turn much darker, especially on the back and head. Some females have a striking pale tan or yellow vertebral stripe with dark borders. A dark interocular bar may sometimes be present. Both sexes often have a small but distinctive black spot on the back of the head. In occasional specimens several other less well-defined spots extend as a series along the back. The belly is pale tan or gray-white, speckled along the sides with brown spots. The gular region is white, yellow-white or sometimes pale yellow-green; in males the underside of the tail is yellowish. The male dewlap is reddish pink behind the brick red anteriorly, with longitudinal rows of white scales, and the tail has wide light and dark brown bands.

Distribution. Anolis maculiventris ranges along the wet Pacific lowlands between central Ecuador and central Colombia (Fig. 1).

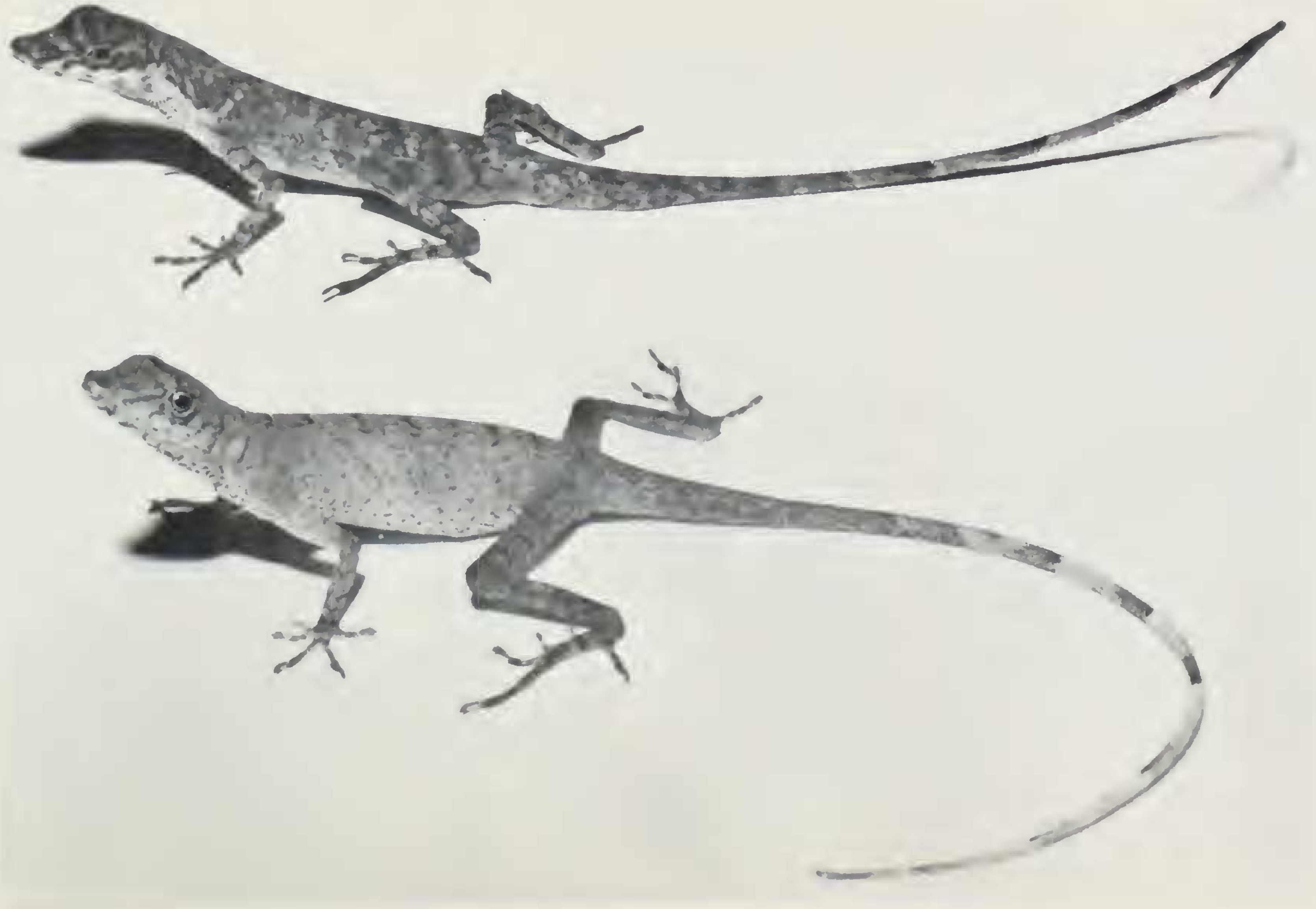

Figure 2. *Anolis medemi* from Gorgona Island: male above, female below.

Status of the members of the fuscoauratoid complex farther north remains unresolved, perhaps involving other undescribed taxa. Whether the Central American fuscoauratoid *A. limifrons* enters Colombia from the Panamanian Darien is uncertain. Dr. Charles Myers is examining populations from that region.

A second western fuscoauratoid anole from Gorgona and Gorgonilla Islands, 56 km off the Colombian Pacific Coast, is described here as a distinct species, closely related to *A. maculiventris.* The earliest specimen we know of was collected in 1938. The species was discussed and illustrated, but not named, in a preliminary treatment of Gorgona Island lizards (Ayala *et al.* 1979: 234–5, figs. 16, 17).

Anolis medemi, new species

Holotype. ICN 4371, adult male, Isla Gorgona (2°59′N, 76°12′W), La Esperanza, Cauca, Colombia. Stephen C. Ayala coll., 22 May 1979.

Paratypes (22). COLOMBIA. *Cauca.* Isla Gorgona: SDNHM 31122: C. S. Perkins coll., 22 February 1938. MCZ 78944–48: Federico Medem coll., 1961. MCZ 168519: Humberto Carvajal coll., 4 April 1977. IND-R-0468: Inge E. Morales, C. Chaparro and Pedro Rodriguez coll., 21 May 1978. IND-R-2226: Humberto Carvajal coll., 21 May 1979. IND-R-2899: Juan Manuel Renjifo coll. MCZ 168520–22: Humberto and Fanny Carvajal coll., 26 May 1979. CSJ 690: Henry von Prahl coll., 26 May 1979. ICN 4364–65, 4367–71, S. C. Ayala, H. Carvajal and F. Carvajal coll., 19–24 May 1979. Isla Gorgonilla: ICN 4366: Olga Castaño coll., 22 May 1979.

Diagnosis. A beta *Anolis* of the *fuscoauratus* species group, most closely related to *A. maculiventris* but slightly larger, with an overall orange-brown color (rather than olive or gray-brown) including a well-defined pattern of darker brown bars and spots on the back and sides.

Description. (Information on holotype in parentheses.) *Head.* Head scales moderate to small, weakly keeled or smooth. Snout moderately short, 9–15 (15) scales across snout between second canthals. Frontal depression moderately deep and well defined, scales within minute, granular, much smaller than surrounding scales, 7–10 (10) across. Five to eight (7) border rostral posteriorly. Anterior nasal in contact with rostral and rostral-first supralabial sulcus. Eight scales between supranasals dorsally.

Supraorbital semicircles well defined, separated by two or three (3) small scales, separated from supraocular disk by one or two rows of circumorbitals. Supraocular disk moderately well defined, 5–11 (8) enlarged scales, usually 1–3 larger than others, smooth or weakly keeled, grading laterally and posteriorly into granules, anterolaterally into moderately large scales, posterolateral area minute granules. One elongate superciliary extends over anterior half superciliary border, followed by 0–2 (1) shorter scales and then by granules. Canthus distinct posteriorly, less defined anteriorly, 8–10, usually 9 (10) scales to below nostril, first and second largest, anteriormost contacting first supralabial scale. Six to nine (9) loreal rows, lowermost largest. Temporals and supratemporals granular, intertemporal area not distinctly differentiated. Supratemporals grading into slightly larger scales around interparietal. Parietal eye clearly defined. Interparietal elliptical, smaller than or subequal to oval ear. Surrounding scales smooth, flat or swollen, much smaller than interparietal. Three to eight (7) scales between interparietal and semicircles, 3–5 between interparietal and smaller rounded granules on nape.

Suboculars in contact with supralabials. Six to nine (8) supralabials to center of eye. Mental almost completely divided, in contact with six to nine (8) scales between infralabials; these scales larger laterally, but no differentiated sublabial rows.

Trunk. Dorsal scales small, granular, weakly keeled, subequal or two to four median rows very slightly enlarged. Ventrals 4–5 × larger than dorsals, smooth, rounded, separate, juxtaposed or slightly subimbricate. Chest scales in female unkeeled (poorly visible in male because of dewlap).

Dewlap. Extending onto anterior one-third of belly in males, absent in females. Lateral scales in well-spaced longitudinal rows, larger than ventrals; edge scales smooth, subequal to or slightly smaller than lateral scales.

Limbs. Limb scales unicarinate dorsally and anteriorly, granular behind. Supradigitals multicarinate. Thirteen to sixteen (15) lamellae under phalanges ii and iii of fourth toe.

Tail. Round or slightly compressed, slender, with no crest,

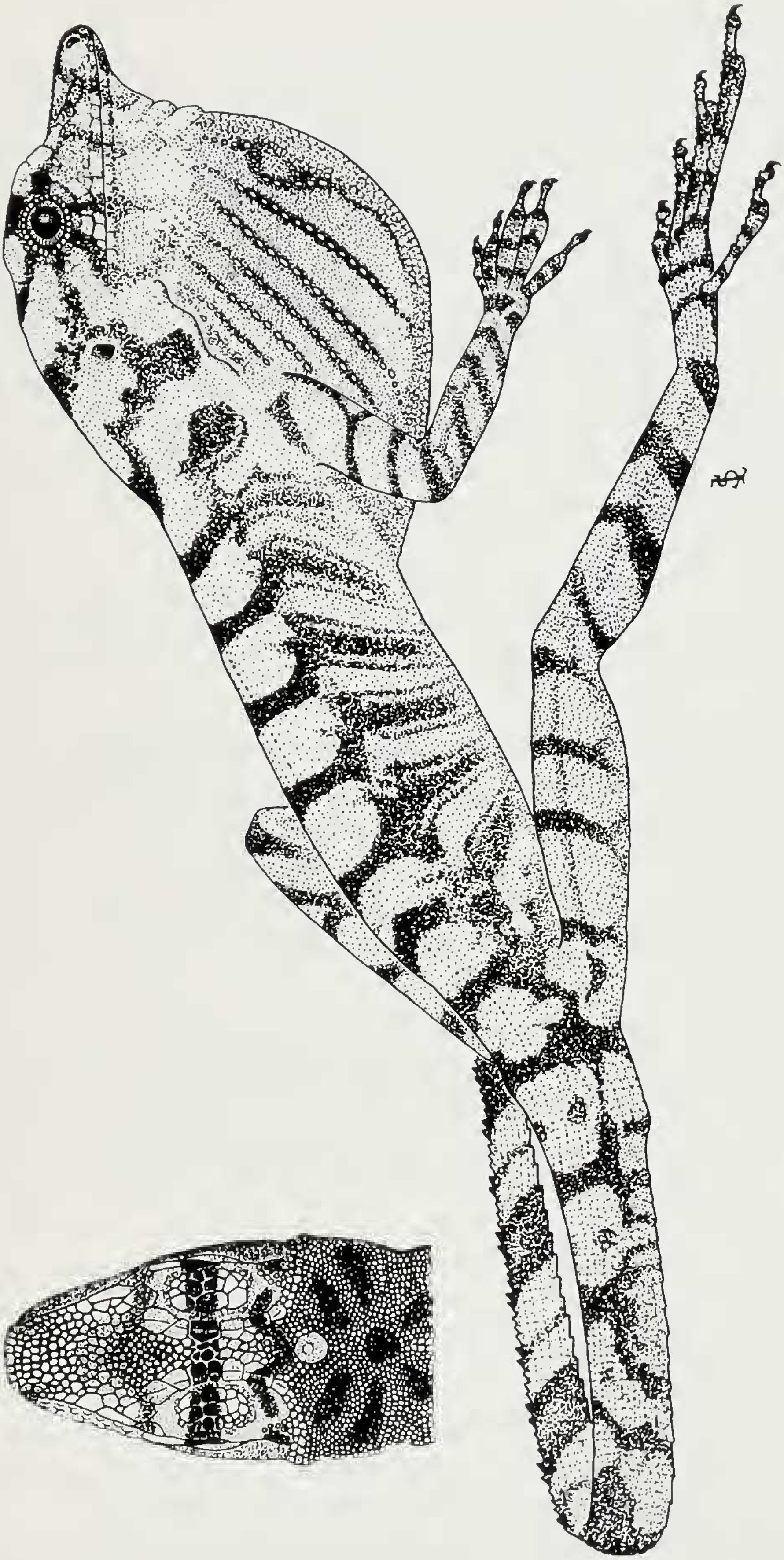

Figure 3. James Lazell's drawing of MCZ 78944 shows the boldly accentuated pattern of the series preserved by Federico Medem.

about 2× snout–vent length. No enlarged postanal scales (except in MCZ 78947).

Measurements. Holotype. Head length 15 mm, head width 7.0, snout–vent length 46, tail 83, foreleg 21, hindleg 37, reaching between eye and ear. Large adults 49–51 (largest of 20, 52 mm) SVL, with a 90–95 mm tail.

Color. Color in life brown with a definite orange cast. Most individuals show some evidence of darker brown bands or bars across body, legs and tail. Those that, like the holotype, are more prominently marked have 9–11 dark brown spots or crossbars along the back, 5–6 becoming vertical or diagonal dark brown bands on flanks, separated by pale yellow-brown zones, lines or spots; in others, darker brown pattern limited to vertebral region. Pale zones toward end of tail sometimes very light tan or even almost white, accentuating contrast with darker brown bands. Several specimens have dark lines radiating forward, upward and back from eye region, and a dark brown supraocular crossbar. Occasional females show sex-linked vertebral stripe morph seen in females of many other anoles; here stripe golden yellow with dark brown edges. Clearly defined occipital spot behind parietal eye; round, dark brown and almost always present even when remaining pattern scarcely visible. Belly pale tan or gray-white, sometimes with tiny brown flecks toward sides. Dewlap new-brick reddish orange, brighter anteriorly, with 5–6 longitudinal lines of yellow scales.

Background color of five paratypes collected by Federico Medem considerably faded, leaving darker pattern curiously accentuated, almost white with bold brown bars (Fig. 3). Most other preserved specimens similarly patterned, but pattern blends slightly, or almost completely in some females, into characteristic orange-brown background color.

Etymology. This lizard is named in memory of Dr. Federico Medem, who first brought this species to our attention, and who was director for many years of the Villavicencio Field Station of the Universidad Nacional de Colombia.

Comparisons. Anolis medemi is easily distinguished from the other three anoles known to occur on Gorgona Island: *A. princeps* Boulenger (some authors have cited it as *A. latifrons*) is much larger and green with brown diagonal stripes on the sides; *A. biporcatus* (Wiegmann) is larger, more robust and usually uniform

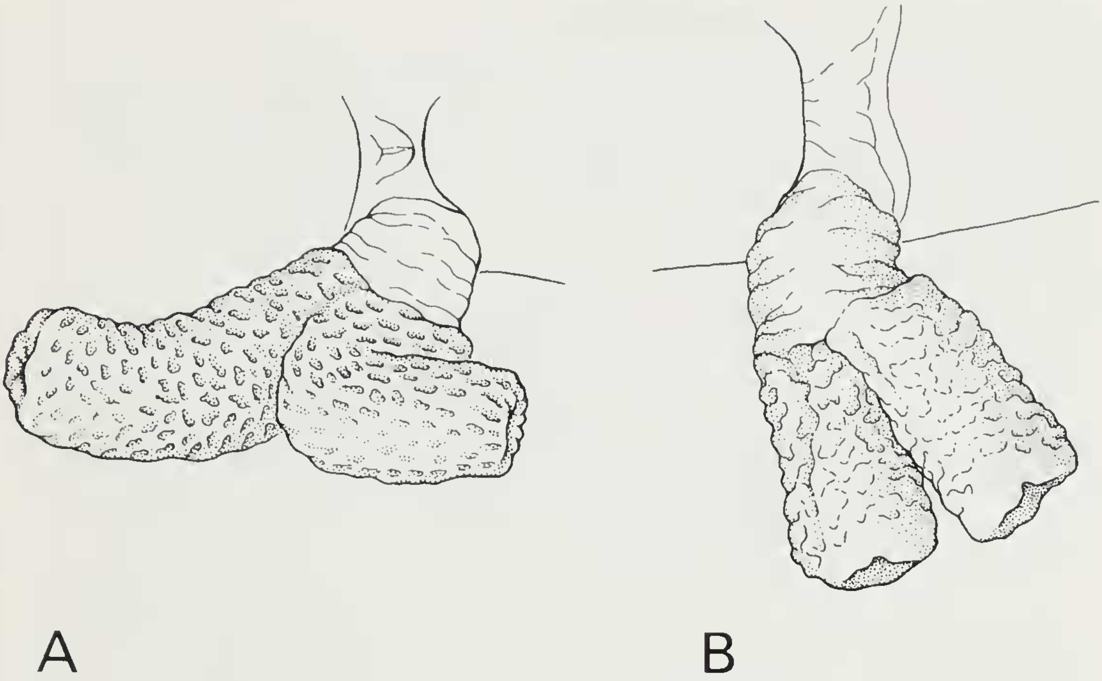

Figure 4. Hemipenes: A. *Anolis medemi.* B. *Anolis maculiventris.*

green—the regional race *A. biporcatus parvauritus* Williams may prove to be a distinct species; and *A. chloris gorgonae* Barbour (variously cited as *A. chloris* or *A. gorgonae*) is a sky-blue insular race of the common green mainland species *A. chloris* Boulenger.

Parker (1926) listed two additional anoles from Gorgona Island whose presence there remains unconfirmed. His two specimens unfortunately seem to have been misplaced while in one of the authors' (SCA) care: BMNH 1926.1.20.106, listed originally as *A.* "*fasciatus,*" is a juvenile *A. chocorum* Williams and Duellman, a rain forest species found sporadically between Costa Rica and western Colombia; BMNH 1926.1.20.107, listed as *A.* "*lemniscatus,*" appears indistinguishable from specimens of *A. tropidogaster,* a bush and grassland anole found in Panama and northern Colombia. Peters and Donoso-Barros' (1970: 48) undocumented mention of *A.* "*binotatus*" on Gorgona might refer to *A. medemi.*

Anolis medemi is closely related to *A. maculiventris.* Scale count ranges overlap almost completely. *A. medemi* has 2–3 scales between the supraorbital semicircles, whereas *maculiventris* usually has 3–4, with no (Ecuadorian) or only occasional (Colombian specimens) counts of 2. Other scale counts cannot be distinguished even modally. The color of the male dewlap is nearly identical. Both species almost always have a round dark spot on the back

Table 1. Color and pattern differences between *Anolis medemi* and *Anolis maculiventris.*

Character	*Anolis medemi*	*Anolis maculiventris*
Basic color	rufus, red- or orange brown	brown, olive-brown, brown-gray
Pattern	usually evident, often prominent; dark bars on sides and back of head, body, tail and legs	sometimes prominent, usually none at all; dorsal surfaces seldom barred, if so not prominent
Vertebral region	series of 9–11 more or less prominent spots or bars between head and tail	often dark; usually little or no trace of dark spots or bars between head and tail; sometimes dark spots at top of lateral bars on flanks
Flank region	usually 5–6 darker brown bars, with no tendency to black	bars if present may be nearly black; usually almost completely absent
Back of head	Dark bar over head between eyes present, usually prominent; occipital spot present	little or no pattern; bar between eyes often not prominent; occipital spot usually present

of the head (smaller in *maculiventris*); both may have 5–6 vertical or diagonal bars on the flanks, sometimes separated by series of round yellow spots (much less often seen in *maculiventris*); and both have occasional uniform brown-gray individuals, especially females, with no visible pattern (much more common in *maculiventris*).

The main differences between the two species involve color and pattern (Table 1), adult size and microhabitat. Living and preserved *A. medemi* are basically orange-brown, while *A. maculiventris* is brown, gray-brown or olive-brown, rarely with any orange cast. The darker brown markings are usually much less visible in *A. maculiventris.* Large adult *A. medemi* measure 49–51 mm SVL and weigh (live weight) about 2.0–2.3 g; large adult *A. maculiventris* measure 45–48 mm and weigh 15–17 g. The hemipenes of the two species are illustrated in Figure 4.

Although vegetation and forest structure on Gorgona Island appeared similar to that on the adjacent mainland, most of the

14 specimens collected by our group were found on thin to intermediate diameter tree trunks or larger branches, about 1.5–3.0 m above the ground; one was on the ground. In contrast, *A. maculiventris* is usually seen on twigs, vines or slender branches 0.5–1.5 m above the ground, or on green or dried leaves in open areas near the ground.

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